In the Claims:

Kindly amend the claims as follows:

1-183. (Cancelled) without prejudice

184. (Currently amended) The apparatus of claim ~~178~~ 209, further comprising ~~an anolyte chamber with lid, and includes~~

(1) an anolyte reservoir coupled to the anolyte chamber,

(2) a dump valve for connecting the anolyte reservoir to the anolyte chamber,

(3) dump valve connecting the anolyte chamber and the anolyte reservoir allowing for the anolyte and contents of the anolyte reaction chamber to be stored in the anolyte reservoir, wherein anytime the lid to the anolyte chamber is opened for access, the dump valve is opened prior to opening the lid such that the liquid contents of the anolyte chamber drops into the anolyte reservoir thereby avoiding potential contact of the anolyte with the user, a waste basket to hold solids in the anolyte chamber; input pump for introducing materials in continuous feed operations into the anolyte chamber and wherein the input pump is connected to a source of the materials to be destroyed, the materials are pumped into the chamber which contains the anolyte used to destroy these materials, and the apparatus continuously circulates the anolyte solution directly from the electrochemical cell through inlet tube into the anolyte chamber to maximize the concentration of oxidizing species contacting the materials includes

(1) a filter located at the base of the anolyte chamber to limit the size of the solid particles flowing from anolyte chamber thereby preventing solid particles large enough to interfere with the flow in the electrochemical cell from exiting the anolyte chamber,

(2) a lever connected to the anolyte chamber lid for lowering the basket into the anolyte when

the lid and the waste basket are closed such that all of the basket's contents are held submerged in the anolyte throughout the MEO process,

(3) a seal around the opening of the anolyte chamber lid,

(4) gaseous material supply system connected to the anolyte chamber for supplying gaseous materials in continuous feed operations, wherein the gaseous materials to be processed are pumped from the gaseous material supply into a pressure vessel,

(5) a regulator on the pressure vessel for controlling release of the materials into the anolyte chamber which contains the anolyte for destroying the gaseous materials, comprising bubble heads for introducing the gaseous materials into the anolyte chamber assuring that the gas entering the gas stream is in the form of small bubbles to create a large surface area on which the anolyte acts to oxidize the gaseous materials, the gaseous materials contact the anolyte in a counter current flow and wherein the gaseous materials are introduced into a lower portion of the anolyte chamber through the gaseous materials supply system, further wherein a stream of freshly oxidized anolyte solution directly from the electrochemical cell is introduced into the upper portion of the anolyte reaction chamber through an inlet tube enabling the gaseous materials to continuously react with oxidizing mediator species in the anolyte as the gas rises up in the anolyte chamber past the downward flowing anolyte and wherein the gaseous materials reaching a top of the anolyte chamber has the lowest concentration of oxidizable species and is also in contact with the anolyte having highest concentrations of oxidizer species,

(6) comprising baffles in the anolyte chamber for regulating progress of the gaseous materials through the anolyte in the anolyte chamber,

(7) liquefier for emulsifying the materials introduced into the anolyte chamber thereby greatly increasing the area of contact between the materials and oxidizers during the electrochemical process and increasing the materials destruction rate,

(8) injector for injecting new anolyte into the anolyte chamber if and as required.

185-188. (Cancelled) without prejudice

189. (Currently amended) The apparatus of claim ~~178~~ 204, further comprising a dewatering system, further comprising a dewatering system having reverse osmosis (RO) units comprising a fluoropolymer/copolymer RO Unit having a membrane of a fluoropolymer/copolymer, wherein the fluoropolymer/copolymer membrane is used for dewatering of the anolyte by an RO unit when the oxidizer being used in the MEO apparatus would damage a membrane made from typical RO membrane materials and wherein cleaning of oxidizable material from the fluoropolymer/copolymer membrane is accomplished by the action of the oxidizer in the anolyte solution as it passes through the RO unit, a multipass RO unit for a dewatering unit where the osmotic pressure head is so large that the pressure limit on the RO membranes may be exceeded or the membrane partition factor may be insufficient to affect the required degree of separation in a single stage, wherein the anolyte or catholyte is pumped by pumps through the RO membrane, RO tubes made out of the RO membrane fill insides of the RO membrane housing, and wherein a dilute solution of the electrolyte is used for lowering the osmotic pressure between the anolyte and catholyte, a dilute electrolyte reservoir for storing the dilute electrolyte which is pumped by a second stage anolyte pump or second stage catholyte pump as the tube side liquid enters into a RO membrane multipass housing, osmotic pressure difference between the tube side liquid and the shell side pure water stream allows operation below pressure limits on the RO membrane, static RO unit wherein volume of the anolyte is relatively small and the flow rate through the RO membrane is low per unit area thus requiring greater flow area such that the total volume of the tubes required for this surface area exceeds the total anolyte volume.

190. (Currently amended) The apparatus of claim ~~178~~ 204, further comprising a dewatering tube for controlling levels of the catholyte by dewatering when levels exceed a set level by

flowing the catholyte back through a dewater reject tube, valve for controlling liquid flowing through the dewatering tube for the adding of returned catholyte or rejecting water makeup from a water storage tank, wherein after the discharging process is complete the discharger output valve opens to the RO pump and the discharged anolyte solution is processed through the RO membrane which is enclosed in the RO membrane housing, and wherein anolyte RO pressure is sensed by a pressure sensor, water storage tank for storing pure water and a valve controlling supply of the water as needed to the dilute electrolyte, RO unit rejecting to catholyte wherein the anolyte and the catholyte are similar in composition and the RO membranes tolerate the electrolytes, wherein excess water in the anolyte is rejected into the catholyte through the RO membrane, wherein the RO again uses the anolyte solution pumped by the pump as the tube side fluid in the RO membrane housing, and wherein the catholyte solution is pumped by the pump through the shell side, returning the anolyte and the catholyte leaving the housing to the anolyte and the catholyte chambers, respectively, a valve opened to allow all the anolyte solution to be transferred from anolyte system through pump into the RO system tubes in the RO membrane housing, high pressure pump for pressurization of the RO system , RO reservoir is pressurized to several thousand psi with air or nitrogen from the pressurized vessel and let stand until the dewatering has reached the desired goal, a regulator for controlling pressure in the RO system by releasing the air or nitrogen gas from the pressurized vessel until the desired pressure has been reached in the RO system and for holding that pressure until the dewatering is complete, a regulator for holding the anolyte under pressure in the RO membrane in the housing and/or a nitrogen pressure vessel for holding the catholyte under pressure with the catholyte RO pump, a regulator for controlling pressure in the RO system by releasing the air or nitrogen gas from the pressurized vessel until the desired pressure has been reached in the RO system and for holding that pressure until the dewatering is complete, storage tank for storing processed water passing through the membrane, wherein the stored water is available to be returned to either the anolyte or the catholyte or to be rejected from the MEO

apparatus, a particulate filter for passing the anolyte and/or catholyte solution exiting the apparatus to remove particulate matter, clean water pump coupled to the cell for pumping clean water into the anolyte chamber and/or the catholyte chamber for restoring levels of the catholyte.

191. (Currently amended) The apparatus of claim ~~178~~ 204, further comprising an osmotic cell wherein the anolyte and the catholyte have properties such that osmotic pressure drives water from anolyte side to catholyte side of the semi-permeable osmotic membrane, wherein the osmosis cell is pressurized on the anolyte side to increase flow and to dewater the anolyte by driving water from the anolyte to the catholyte, an osmotic cell with selected osmotic fluid wherein the catholyte has too low an osmotic pressure difference and the water in the anolyte will not cross the osmotic membrane, and wherein a second osmotic fluid with a higher osmotic pressure is provided to permit water to pass through the membrane, osmotic cell comprises two separate chambers wherein the anolyte and/or the catholyte flow along one side of an osmotic membrane and wherein another side of the osmotic membrane is in contact with an osmotic fluid having an osmotic pressure that allows water in the anolyte or catholyte to cross the osmotic membrane, an osmotic reservoir for storing the osmotic fluid, a pump for pumping the osmotic fluid from the osmotic reservoir through the osmotic cell and back to the osmotic reservoir, osmotic valve for dewatering the anolyte or the catholyte by operating the valve to allow flow into the RO membrane housing containing the RO membranes.

192. (Currently amended) The apparatus of claim ~~178~~ 204, further comprising a vacuum evaporation unit for removing water from the anolyte and/or catholyte vacuum evaporation, nanofilters for pretreatment of the materials to remove solids and soluble substances from the anolyte feed stream to the evaporator avoiding air-borne infectious release, wherein filtered anolyte and/or catholyte flows into the evaporator, and from the evaporator returns to the anolyte and/or the catholyte chambers and continue to circulate through the vacuum evaporator unit until excess , water in the solutions are reduced to desired levels, vacuum pump for reducing pressure in the evaporator system to less than a

vapor pressure of water in the anolyte and/or catholyte at their respective temperatures, and a condenser connected to the system wherein water evaporates and progresses into the condenser, wherein pressure in the evaporator condenser system is controlled by vapor pressure of water at the condenser temperature.

193. (Currently amended) The apparatus of claim ~~178~~ 209, further comprising a controller system comprising computing devices including automated programmable logic controllers (PLCs) coupled to pneumatic controls and system sensors for monitoring the process performed by the MEO apparatus, displaying data and status information on a monitor relative to the monitoring, executing operational cycles in the MEO apparatus, providing methodology to change parameters in the MEO process through digital control over system components including flow control of the anolyte and the catholyte, electrochemical cell power, off-gas systems, ultraviolet and ultrasound systems, further wherein the controller system comprises methodology to monitor and change the MEO parameters including numerous mediator and electrolyte combinations, and wherein the controller system maintains a record of operation of the MEO apparatus for post operation analysis using data recorded in the data logger, comprise storing on the PLC default values for typical parameters such as percent pump flow rate, anolyte and catholyte volume capacity, anolyte and catholyte temperatures, valve operation and sequencing, enabling and disabling of RO dewatering, water makeup in the anolyte and catholyte systems, ultrasonic and ultraviolet source operations, off-gas temperatures, and enabling and disabling the data logging, display includes a touch screen monitor for providing an operator of the MEO apparatus with options for running the apparatus, for displaying status of each component in the MEO apparatus based on the information received from the sensors including state of the oxidation process to directly evaluate the data from the sensors on the monitor, and instrumentation processed through a signal conditioner, for measuring activity of redox couples using an oxidation reduction potential (ORP) sensor located throughout the MEO apparatus, connections for connecting the

controller to the internet and to other operators for real-time interactive sensing, analyzing, monitoring, viewing, and controlling all parameters and components of the MEO apparatus, connections are connections to the internet, phone line, cell phone, personal computer (PC), and other media devices, a data logging system for recording sensor data used to assess performance and past use of the system for viewing remotely or on-site, wherein the controller system provides information to diagnose problems associated with the MEO apparatus, comprising microprocessors or multi-position cyclic timer switches.

194. (Currently amended) The apparatus of claim ~~178~~ 209, further comprising an off-gas system for processing off-gas from the anolyte reaction chamber from complete and incomplete combustion of the material including carbon-dioxide, oxygen from oxidation of water molecules at the anode and possibly small amounts of low molecular weight hydrocarbons from incomplete combustion that are gases at the anolyte operating temperature and pressure, an exhaust for exhausting the off-gas extracted by air flow through the anolyte chamber and catholyte chamber, exhaust fan in the exhaust for drawing ambient air into the anolyte chamber through the anolyte air intake/filter and into the catholyte chamber through the catholyte air intake/filter, anolyte chiller, wherein the anolyte demister is cooled by the anolyte chiller , anolyte demister wherein reaction products resulting from the oxidation in the anolyte system are discharged through the anolyte off-gas exit tube to the anolyte demister, wherein easily condensed products of incomplete oxidation are separated in the anolyte demister from the anolyte off-gas stream and are returned to the anolyte chamber or the anolyte reservoir through an anolyte condensate return tube for further oxidation, a gas cleaning system for reducing non-condensable incomplete oxidation products to acceptable levels for atmospheric release after the anolyte off-gas is contacted in a counter current flow gas scrubbing system in the gas cleaning system, wherein the noncondensables from the anolyte demister are introduced into the lower portion of the column through a flow distribution system of the gas cleaning system and a small side stream of

freshly oxidized anolyte direct from the electrochemical cell is introduced into the upper portion of the column resulting in the gas phase continuously reacting with the oxidizing mediator species as it rises up the column past the down flowing anolyte, catholyte off-gas handling system for drawing ambient air through the catholyte reservoir and through the catholyte off-gas exit tube to a catholyte demister by the exhaust fan, wherein water vapor in the air stream is condensed in the catholyte demister by the coolant from the catholyte chiller and the condensate returns to the catholyte reservoir through the catholyte condensate return tube.

195. (Currently amended) The apparatus of claim ~~178~~ 204, further comprising a nitrogen gas system comprising a nitrogen gas bottle having a gas valve for opening and closing the nitrogen gas bottle, wherein the gas valve is closed when the nitrogen gas bottle is being removed from the MEO apparatus and when the gas valve is opened a nitrogen pressure regulator controls the nitrogen gas pressure to the nitrogen gas system, and wherein the nitrogen gas pressure regulator is controlled by commands from the PLC, nitrogen gas system is used to purge the catholyte reservoir if hydrogen gas exceeds a two percent level in the off-gas handling system, catholyte reservoir purge regulator which is opened by a command from the PLC allowing nitrogen gas to flow and/or to purge the catholyte reservoir and a catholyte reservoir purge valve closes the catholyte air sparge so that the nitrogen purges the catholyte reservoir.

196. (Currently amended) The apparatus of claim ~~178~~ 204, further comprising a hydrogen gas system wherein the catholyte solution enters the catholyte reservoir from the electrochemical cell and returns from the catholyte reservoir through the catholyte pump to the catholyte system and hydrogen exits the catholyte reservoir and the amount of hydrogen is detected by a hydrogen gas detector, wherein the hydrogen off-gas passes through a catholyte demister, and chilled coolant flows from a catholyte chiller to the catholyte demister and returns to the catholyte chiller, wherein the hydrogen gas is not collected for further use and is diluted by air entering the catholyte reservoir

through the catholyte air intake filter when the catholyte air intake valve is in the open position, wherein the hydrogen selection valve is positioned by commands from the PLC to exhaust the diluted hydrogen through the exhaust fan to the off-gas vent, wherein the hydrogen gas is collected for use by either a fuel cell system or a combustion system such as a water heater, wherein the catholyte air intake valve is in the closed position, the hydrogen selection valve is in the position to pass the hydrogen gas to hydrogen gas pump which compresses the hydrogen which passes through a hydrogen gas regulator, a hydrogen sensor measures the percentage of hydrogen gas flowing to the hydrogen gas regulator, compressed hydrogen is stored in a pressurized hydrogen storage bottle and hydrogen is released through the hydrogen regulator to devices in use.

197. (Currently amended) The apparatus of claim ~~178~~ <u>204</u>, further comprising a discharger comprising two or more electrodes between which the anolyte flow is directed during the discharge process is introduced in the anolyte flow stream, a discharger input valve is opened to allow the anolyte to enter the discharger, and a discharger output valve is opened to permit the flow of the anolyte leaving the discharger to flow through the sensor back to the anolyte chamber, further comprising low voltage AC or DC electro potential applied between adjacent discharger electrodes selected so as to cathodically reduce the oxidizer species present in the anolyte without causing their production via anodic oxidation, wherein the low voltage discharges the oxidizers in the anolyte and the discharger provides electrons to the oxidizers when they are returned to their reduced form, an oxidation reduction potential (ORP) sensor senses the oxidized mediators in the anolyte being discharged which circulates through the discharger until the mediator oxidation potential reaches a pre-determined level.

198-200. (Cancelled) without prejudice

201. (Currently amended) The apparatus of claim ~~178~~ <u>209</u>, further comprising inherent safety features includes

(1) automated apparatus operations to assure all requisite operations and safe guards are synchronized with human activity,

(2) all operations of apparatus are interlocked with all others enabling safe and automated operations,

(3) fully instrumentation to signal alarms when any operating parameters (heater/chiller temperatures, anolyte/catholyte temperatures, ARC level, or anolyte/catholyte flow rate or pressure) are out of default range,

(4) full instrumentation to signal sensor failure and/or electrical interrupt,

(5)alarms that signal a problem and/or failure,

(6) instrumentation that put apparatus into safe mode when problems and/or failures occur,

(7) fail-safe protected when apparatus if operated manually,

(8) monitoring of pressures and temperatures are to protect apparatus equipment.

202. (Currently amended) The apparatus of claim ~~178~~ 209, further comprising inherent safety features includes

(1) containment vessel with a capacity to hold all the anolyte and catholyte in the apparatus,

(2) leak detectors that sense a leak and the controller automatically goes into shutdown mode,

(3) automatically introduce a neutralizing and absorbing materials from the oxidizer suppress injection tank injected into the containment pan based on the sensor detecting electrolyte,

(4) discharging plates may be in the containment pan to discharge the oxidizer in the electrolyte as soon as the sensor detects presences of electrolyte in the containment pan,

(5) controller reports the status of the materials disposal through the display monitor and places the system in a standby mode when the disposal is complete,

(6) hydrogen detectors will initiate a controlled safe shutdown of the MEO apparatus should

the hydrogen gas level exceed a safety limit,

(7)apparatus is segmented by impervious bulkheads to separate auxiliary power systems, gas supply and controller systems from the anolyte and catholyte circulation.

203. (Currently amended) The apparatus of claim ~~178~~ 209, further comprising an internal power supply providing AC and DC power to the components of the apparatus, external power may be 110 volts AC or higher; internal power supply converts AC to DC and provides a variety of voltage levels throughout the apparatus; a NEMA box may be used to protect from igniting off gases from electrical arcs; electrical compartment may be slightly positive pressurized by air intake and air exhaust fans to not allow off gases to enter the compartment.

204. (Previously presented) Apparatus for treating and oxidizing materials comprising new unique electrochemical cell for various embodiments and other appropriate applications, wherein all surfaces in the electrochemical cell that come into contact with the electrolyte, are made of material selected from the group consisting of polyvinylidene fluoride (PVDF), polypropylene (PP), ethylene-chlorotrifluoroethylene (Halar), polytetrafluoroethylene (PTFE), and combinations thereof, further comprising cell materials selected from the group consisting of fiberglass, polypropylene, metals, composite metals, and combinations thereof, an electrochemical cell comprising a box, a lid, and input and exit tubings through the lid to allow anolyte and/or catholyte to enter and exit respectively through the tubings to and from the electrochemical cell, the box and lid being composed of metal(s) and/or metal composites and the surfaces in contact with the electrolytes are coated with a glass glaze or metallic oxides, wherein separated cell containing the anolyte are connected by anolyte conduits in the wall of the electrochemical cell so that the anolyte solution flows through the entire electrochemical cell and wherein the cell containing the catholyte are connected by catholyte conduits in the wall of the electrochemical cell thereby enabling easy maintenance through ease of access to the interior of the box and to the membranes.

205. (Previously presented) The apparatus of claim 204, wherein the electrochemical cell has a molded unibody construction and the lid is coupled to the box, slots in the box for holding frames, wherein the frames receive and hold the membranes in liquid-tight manner to keep the anolyte and catholyte separated, comprising porous electrodes so that electrolyte flows through the electrodes and contacts both sides of the electrodes, a gasket in the lid for creating a tight seal, interior walls in the box for separating the anolyte from the catholyte, electrodes including anodes and cathodes in slots in the ceramic walls and electrical connections to the electrodes passing through the lid to anode bus and cathode bus, walls of the box having ridges and grooves to promote turbulent flow thereby reducing adverse boundary layer related phenomena at the anodes, plurality of electrochemical cells coupled together and having a pier box and lid, nuts and bolts and clamp holes on the box and/or lid for coupling the lid to the box as well as providing easy access to interior of the electrochemical cell significantly improving the maintenance of the electrochemical cell, interior surfaces having PTFE coating to protect the surfaces from oxidizers in the anolyte and acids or alkaline in the catholyte, glazed inside surfaces of the box and the lid to protect the ceramic walls from the oxidizer in the anolyte solution and the acids or alkaline in the catholyte solution, comprising oxidation resistant ion selective membranes bonded over interior walls serving as ceramic membranes for supplementing performance of the ceramic membranes, wherein some of the interior walls are ion selective semi-permeable membranes.

206. (Previously presented) The apparatus of claim 204, further comprising platinum wires and/or miniature ORP electrodes in each chamber of the anolyte and catholyte chambers positioned such that the electrical potential may be measured between the chambers to provide information of the concentration of oxidizer in the anolyte chamber and also as an indicator of any leakage in the membrane, concentration level may be controlled by varying the DC current in the electrochemical

cell, oxidizer level may be controlled by diverting some of the anolyte into the discharger and back to the cell.

207. (Previously presented) Apparatus of claim 204 for treating and oxidizing materials comprising a fully scalable technology sizable to volume, throughput, and composition of materials to be processed, further comprising materials selected from the group consisting of:
medical (including medical materials, infectious materials, sharps, pathological materials, sterilization and disinfection); veterinary materials (including animal medical waste, whole research animals); pharmaceutical materials (including out-of-date drugs, rejected drug production, illegal drugs); animal materials (including animal parts, animal excretions, beddings); animals (including laboratory research animals such as mice, rabbits, and large animals such as swine, cows); food materials (including food preparation, unconsumed and partially consumed); solid residential materials (including household trash); solid commercial materials (including paper, plastics); ship materials (including government ships, commercial ships, and private ships and boats); municipal sewage (including municipal sludge); mortuary materials (including the disposal of body fluids, fluids used in embalming process); halogenated hydrocarbons (includes most of the halogenated hydrocarbons except fluorinated hydrocarbons); military materials (including both organic and inorganic products), transportation (including cleaning and disposing of materials carried in train tank cars, highway tank trucks); landfill materials(including hazardous runoff, hazardous materials); land recover (including brown fields, soil remediation); energetics and pyrotechnics (including explosive materials); herbicides and pesticides (including disposal of herbicides and pesticides, cleaning contaminated equipment); mining (including gold and silver mine tailing, cyanides, and other process); carbon compounds (including incinerator ash); metallurgical industry (including metal plating, metal cleaning); transuranics/actinides (including dissolution of transuranics/actinides, destroying mixed waste); chemical intermediates (including decomposing

organic compounds from a higher carbon content to molecules of lesser content to be used as intermediates in other chemical process); paper industry (including the replacement of chlorine in the paper making and recycling process); ozone generation at low voltage (including replacement for bleaching processes, disinfection); absorption of volatile organic carbons (including the use of the MEO apparatus as a scrubber); chlorine process industry (including the replacement of chlorine as a bleach and/or as an oxidizer with an environmentally benign MEO process); chemical fertilizers industry (including the conversion of manures and municipal sludge to inorganic compounds to use as fertilizers); micro-processor industry (including the replacement of hazardous solvents, cleaning and conditioning of printed circuit boards); halogenated inorganic industry (including all halogenated inorganic compounds except those containing fluorine); and hydrogen fuel industry (including the generation of hydrogen for fuel cells, the generation of hydrogen for hydrogen burners for such items as water heaters and furnaces), and combinations thereof.

208. (Cancelled) without prejudice

209. (New) Apparatus comprising a mediated electrochemical oxygen system for treating and oxidizing materials further comprising new unique electrochemical cell, wherein the electrochemical cell has a molded unibody construction box and a lid is coupled to the box, interior walls in the box, plural membranes in the box, slots in the interior walls for holding membranes, wherein the slots receive and hold the membranes in liquid-tight manner, anolyte and catholyte in the box separated on opposite sides of the plural membranes, porous electrodes positioned in the boxe so that the anolyte and the catholyte flow through the electrodes and contact both sides of the electrodes, a gasket between the box and the lid for creating a tight seal, wherein the interior walls in the box are connected to the plural membranes for separating the anolyte from the catholyte, wherein the electrodes include anodes and cathodes extending from the slots in the walls and electrical connections connected to the DC power supply and to the electrodes and passing through the lid to an anode bus

and a cathode bus on the lid.

210. (New) The apparatus of claim 209, wherein the interior walls of the box having ridges and grooves to promote turbulent flow, thereby reducing adverse boundary layer related phenomena at the electrodes.

211. (New) The apparatus of claim 209, wherein the interior walls, the membranes and the electrodes form plurality of electrochemical cells coupled together and with the electrical connections and the buses and nuts and bolts and clamp holes on the box and the lid adapted for coupling the lid to the box as well as providing easy access to interior of the electrochemical cell.

212. (New) The apparatus of claim 209, further comprising glazed inside surfaces of the box and the lid to protect the surfaces from an oxidizer in the anolyte and acids or alkaline in the catholyte solution.

213. (New) The apparatus of claim 209, wherein the walls of the electrochemical cell are ceramic walls and further comprising oxidation resistant ion selective membranes bonded over interior walls serving as ceramic membranes, wherein oxidation resistant membranes supplement performance of the plural membranes.

214. (New) The apparatus of claim 209, wherein the box and lid are a pier box and lid made from materials selected from the group consisting of fiberglass, polypropylene, metals and composite metals, and wherein interior surfaces of the pier box have a PTFE coating to protect the surfaces from oxidizer in the anolyte and from acids or alkaline in the catholyte.

215. (New) The apparatus of claim 209, further comprising platinum wires or miniature oxidation reduction potential (ORP) electrodes inserted through the lid in each of the anolyte and catholyte and positioned such that electrical potential may be measured between the anolyte and the catholyte to provide information of the concentration of oxidizer in the anolyte and also as an indicator of any leakage in the plural membranes.

216. (New) Apparatus of claim 209, further comprising an oxidation reduction potential (ORP) sensor incorporated in the cell to sense level of oxidizer in the anolyte, an ORP sensor detects the level of oxidizer being produced by the electrochemical cell in an anolyte exit stream from the electrochemical cell, a processor and a signal conditioner connected to the ORP and to the processor, an algorithm in the processor adapted to calculate desired oxidizer concentration in the anolyte solution, and a regulation output from the processor adapted to issue commands that regulate the DC power from the DC power supply, wherein the DC power supply provides the DC potential across the anodes and cathodes in the electrochemical cell, wherein when selected oxidizer concentration level in the anolyte sensed by the ORP is reached, the DC power to the electrochemical cell is reduced or interrupted until the oxidizer level drops to or below the selected oxidizer level, at which point the DC current from the DC power supply are restored in the cell.

217. (New) The apparatus of claim 209, further comprising a discharger connected to the electrochemical cell and a pump connected to the electrochemical cell and to the discharger, for providing controlling anolyte flow between the discharger and the electrochemical cell.

218. (New) The apparatus of claim 209, further comprising a dewatering system connected to the electrochemical cell, the dewatering system having reverse osmosis (RO) units comprising a fluoropolymer/copolymer RO unit having a membrane of a fluoropolymer/copolymer, wherein the fluoropolymer/copolymer membrane used for dewatering of the anolyte by the RO unit when oxidizer in the anolyte in the MEO apparatus would damage a membrane made from typical RO membrane materials and wherein cleaning of oxidizable material from the fluoropolymer/copolymer membrane is accomplished by the action of the oxidizer in the anolyte solution as it passes through the RO unit, a multipass RO unit for a dewatering unit where the osmotic pressure head is so large that the pressure limit on the RO membranes may be exceeded or the membrane partition factor may be insufficient to affect the required degree of separation in a single stage, wherein the anolyte or

catholyte is pumped by pumps through the RO membrane, RO tubes made out of the RO membrane fill insides of the RO membrane housing, and wherein a dilute solution of the electrolyte is used for lowering the osmotic pressure between the anolyte and catholyte, a dilute electrolyte reservoir for storing the dilute electrolyte which is pumped by a second stage anolyte pump or second stage catholyte pump as the tube side liquid enters into a RO membrane multipass housing, osmotic pressure difference between the tube side liquid and the shell side pure water stream allows operation below pressure limits on the RO membrane, static RO unit wherein volume of the anolyte is relatively small and the flow rate through the RO membrane is low per unit area thus requiring greater flow area such that the total volume of the tubes required for this surface area exceeds the total anolyte volume.

219. (New) The apparatus of claim 209, further comprising a dewatering tube for controlling levels of the catholyte by dewatering when levels exceed a set level by flowing the catholyte back through a dewater reject tube, valve for controlling liquid flowing through the dewatering tube for the adding of returned catholyte or rejecting water makeup from a water storage tank, wherein after the discharging process is complete the discharger output valve opens to the RO pump and the discharged anolyte solution is processed through the RO membrane which is enclosed in the RO membrane housing, and wherein anolyte RO pressure is sensed by a pressure sensor, water storage tank for storing pure water and a valve controlling supply of the water as needed to the dilute electrolyte, RO unit rejecting to catholyte wherein the anolyte and the catholyte are similar in composition and the RO membranes tolerate the electrolytes, wherein excess water in the anolyte is rejected into the catholyte through the RO membrane, wherein the RO again uses the anolyte solution pumped by the pump as the tube side fluid in the RO membrane housing, and wherein the catholyte solution is pumped by the pump through the shell side, returning the anolyte and the catholyte leaving the housing to the anolyte and the catholyte chambers, respectively, a valve opened to allow all the anolyte solution to be transferred from anolyte system through pump into the RO system tubes in the

RO membrane housing, high pressure pump for pressurization of the RO system , RO reservoir is pressurized to several thousand psi with air or nitrogen from the pressurized vessel and let stand until the dewatering has reached the desired goal, a regulator for controlling pressure in the RO system by releasing the air or nitrogen gas from the pressurized vessel until the desired pressure has been reached in the RO system and for holding that pressure until the dewatering is complete, a regulator for holding the anolyte under pressure in the RO membrane in the housing and/or a nitrogen pressure vessel for holding the catholyte under pressure with the catholyte RO pump, a regulator for controlling pressure in the RO system by releasing the air or nitrogen gas from the pressurized vessel until the desired pressure has been reached in the RO system and for holding that pressure until the dewatering is complete, storage tank for storing processed water passing through the membrane, wherein the stored water is available to be returned to either the anolyte or the catholyte or to be rejected from the MEO apparatus, a particulate filter for passing the anolyte and/or catholyte solution exiting the apparatus to remove particulate matter, clean water pump coupled to the cell for pumping clean water into the anolyte chamber and/or the catholyte chamber for restoring levels of the catholyte.

220. (Currently amended) The apparatus of claim 209, further comprising an osmotic cell wherein the anolyte and the catholyte have properties such that osmotic pressure drives water from anolyte side to catholyte side of the semi-permeable osmotic membrane, wherein the osmosis cell is pressurized on the anolyte side to increase flow and to dewater the anolyte by driving water from the anolyte to the catholyte, an osmotic cell with selected osmotic fluid wherein the catholyte has too low an osmotic pressure difference and the water in the anolyte will not cross the osmotic membrane, and wherein a second osmotic fluid with a higher osmotic pressure is provided to permit water to pass through the membrane, osmotic cell comprises two separate chambers wherein the anolyte and/or the catholyte flow along one side of an osmotic membrane and wherein another side of the osmotic membrane is in contact with an osmotic fluid having an osmotic pressure that allows water in the

anolyte or catholyte to cross the osmotic membrane, an osmotic reservoir for storing the osmotic fluid, a pump for pumping the osmotic fluid from the osmotic reservoir through the osmotic cell and back to the osmotic reservoir, osmotic valve for dewatering the anolyte or the catholyte by operating the valve to allow flow into the RO membrane housing containing the RO membranes.

221. (New) The apparatus of claim 209, further comprising a vacuum evaporation unit for removing water from the anolyte and/or catholyte vacuum evaporation, nanofilters for pretreatment of the materials to remove solids and soluble substances from the anolyte feed stream to the evaporator avoiding air-borne infectious release, wherein filtered anolyte and/or catholyte flows into the evaporator, and from the evaporator returns to the anolyte and/or the catholyte chambers and continue to circulate through the vacuum evaporator unit until excess , water in the solutions are reduced to desired levels, vacuum pump for reducing pressure in the evaporator system to less than a vapor pressure of water in the anolyte and/or catholyte at their respective temperatures, and a condenser connected to the system wherein water evaporates and progresses into the condenser, wherein pressure in the evaporator condenser system is controlled by vapor pressure of water at the condenser temperature.

222. (New) The apparatus of claim 209, further comprising a discharger that suppresses electrochemically oxidizers in the anolyte solution when they are not needed or not wanted, wherein a discharge comprises two or more electrodes between which the anolyte flows during discharge, the anolyte, an input valve, a low voltage electrical potential source connected to the electrodes, a switch controlling connection of the source to the discharger, a return through which the anolyte flows out of the discharger and returns to the anolyte reaction chamber.

223. (New) The apparatus of claim 209, further comprising an oxidizer suppression injection systems, wherein oxidizers in the anolyte are suppressed by benign material, wherein the benign material is stored in a suppressor tank.

224. (New) The apparatus of claim 209, further comprising a nitrogen gas system having a nitrogen gas bottle and a manual gas valve that opens and closes the nitrogen gas bottle, when the manual gas valve is opened the nitrogen pressure regulator controls the nitrogen gas pressure to the nitrogen gas system, the nitrogen gas pressure regulator is controlled by commands from a processor and the nitrogen gas system is used to purge the catholyte reservoir in case the hydrogen gas exceeds a two percent level in the off-gas handling system, the catholyte reservoir purge regulator is opened by a command from the PLC allowing nitrogen gas to flow, the catholyte reservoir purge valve is opened by a PLC command allowing nitrogen gas to purge the catholyte reservoir, catholyte reservoir purge valve closes the catholyte air sparge so that the nitrogen purges the catholyte reservoir, wherein the second embodiment of the nitrogen gas system is to provide gas pressure to power the valves in the anolyte system and catholyte system, the nitrogen instruments enable valve opens by command from the PLC to provide nitrogen gas pressure to instruments and actuators, the nitrogen gas pressure is regulated to the instruments by the instrument nitrogen pressure regulator, and to the actuators by the actuator nitrogen pressure regulator.

225 (New) The apparatus of claim 209, further comprising a hydrogen gas system for the catholyte reservoir when selected catholytes are used, a processor controls through operator selection which of the two embodiments are to be used when the MEO apparatus is operating, wherein when the first hydrogen gas is not going to be collected for further use, hydrogen is diluted by air entering the catholyte reservoir through the catholyte air intake filter when the catholyte air intake valve is in the open position, the hydrogen selection valve is positioned by commands from the PLC to exhaust the diluted hydrogen through the exhaust fan to the off-gas vent, the hydrogen gas detector monitors the hydrogen to insure the percentage of hydrogen is at or below the regulated safe level, the sail switch monitors the flow through the exhaust fan to ensure the flow is adequate, the catholyte solution enters the catholyte reservoir from the electrochemical cell and returns from

the catholyte reservoir through the catholyte pump to the catholyte system, the hydrogen exits the catholyte reservoir and a hydrogen gas detector detects the amount of hydrogen, the hydrogen off gas passes through a catholyte demister, a chilled coolant flows from the catholyte chiller to the catholyte demister and returns to the catholyte chiller.

226. (New) The apparatus of claim 209, further comprising a hydrogen gas system for the catholyte reservoir selected catholytes are used, a processor controls through operator selection which of the two embodiments are to be used when the MEO apparatus is operating, wherein when the hydrogen gas is being collected for use by either a fuel cell system or a combustion system such as water heater, the catholyte air intake valve is in the closed position, the hydrogen selection valve is in the position to pass the hydrogen gas to hydrogen gas pump, the hydrogen gas pump compresses the hydrogen, which passes through a hydrogen gas regulator, the hydrogen sensor measures the percentage of hydrogen gas flowing to the hydrogen gas regulator, the compressed hydrogen is stored in a pressurized hydrogen storage bottle, the hydrogen is released through the hydrogen regulator to the in use devises, in both embodiments there is a nitrogen gas bottle connected to the catholyte reservoir through a nitrogen pressure regulator, the nitrogen is used to purge the hydrogen gas out of the catholyte reservoir and connecting components by opening the nitrogen purge valve, wherein a third embodiment the hydrogen gas is captured by zirconium or Ziralloy getters, the getters for latter disposal absorb the hydrogen gas.

227. (New) The apparatus of claim 209, further comprising safety systems apparatus safety containment pan built into the MEO apparatus with the capacity to hold all the electrolytes (both anolyte and catholyte together) without spilling it outside the apparatus, the containment pan may hold a neutralizing and absorbing agent to assist in the containment of the electrolytes, the electrolyte may be contained from either a leak or catastrophic failure from either the anolyte system and/or the catholyte system, the containment pan has a spill sensor to detect the introduction of any

electrolyte into the containment pan, wherein a second embodiment of the MEO apparatus may automatically introduce a neutralizing and absorbing materials from the oxidizer suppression injection tank injected into the containment pan based on the sensor-detecting electrolyte.